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## PATENT SPECIFICATION

NO DRAWINGS

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## Hop extract.

## COMPLETE SPECIFICATION

I, MARIA BRIEM of Au/Hallertau, West Germany, of German nationality, do hereby declare the invention for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to hop extracts.

Numerous efforts have been made in the past in the brewing industry in attempts to reduce the cost of the production of beer and to manufacture a product of high uniform quality, excellent taste, clarity and stability. In this connection attempts have been made to improve the yield of useful substances obtainable from hops and, in particular, of the bitter principles since, in the conventional boiling of the hops, only about 3.5% of the latter pass over into the beer.

It has already been proposed to replace at least a portion of the bulk hops as used in the production of beer by a hop extract. This hop extract is normally prepared by treating the hops with water and thereafter with an organic solvent, such as an alcohol, ether or halogenated hydrocarbon. Subjecting the hops to this extraction treatment has been found to increase the yield of bittering principles obtainable from the hops.

However, known methods of producing hop extracts have the disadvantage that they require very long extracting periods and result in extracts of relatively low concentration so that it is necessary to drive off very large quantities of solvents contained therein, which renders the extracting process expensive.

In conventional processes for brewing beer there has been added to each brew batch a hop extract of relatively low concentration (generally enough to provide 50 to 70% of the quantity of hops required). The hop extracts previously available consist only of about 30 to 35% of useful substances, the remainder being water and insoluble sub-

stances, such as fibres and sediment.

This invention seeks to provide a novel hop extract which may be produced by the action of small quantities of solvent on the hops and having a high content of the bitter principles without the above-mentioned disadvantages, substantially all of the useful substances in the hops being contained in the extract.

In accordance with the present invention, there is provided a stable hop extract comprising 70 to 80% of bitter principles and 20 to 30% of a mixture of tannin, pectin, albumen, celluloses, aromatic acids and water.

Preferably the proportions of the bitter principles and the tanning principles are the same as in the original hops from which the extract is produced, although they can be otherwise adjusted to the requirements of the brewing process in which the extract is to be used.

The extract may be obtained by the following process which comprises two stages, as follows,

a) the hops are finely ground in the presence of a suitable organic solvent, e.g. trichloroethylene, methanol or ether, to extract all the bitter principles, consisting mainly of humulone and lupulone. This stage takes approximately ten minutes at room temperature using a high speed disintegrator. The extract is then freed from the solvent, preferably by vaporisation.

b) the hops residue from stage a) is then leached with hot water, which may be heated by bubbling steam through it for 20 to 40 minutes to extract the remaining useful substances i.e. tannins, pectins, albumens, celluloses, and aromatic acids. The extract is then filtered and concentrated.

The extract from stage a) is then mixed with the extract from stage b). The relative proportions of the various substances in the combined extract will then be substantially the same as in the hops from which the

extract was made. However, to allow for differences between various batches of hops, the ratio in which the extract from stages a) and b) are mixed may be adjusted to obtain extracts of substantially identical composition from the various batches.

The residue remaining after separation of the water-soluble material contains substantially nothing but fibrous vegetable material and can be discarded.

The highly concentrated extract produced by the above process is stable substantially indefinitely. This is a most important advantage especially where the extract has to be prepared and stored in tropical or sub-tropical areas or where refrigeration is inadequate.

Furthermore, the extract contains the bitter principles in a particularly effective form, the actual bitter-imparting capacity of the extract being surprisingly greater than would be expected on the basis of the flavouring resin concentration therein. As a result it is possible to use less of the extract to flavour the beer than would be expected from the calculation as to the amount of hops required.

#### WHAT I CLAIM IS:—

1. A stable hop extract comprising 70 to 80% of bitter principles and 20 to 30% of a

mixture of tannin, pectin, albumen, cellulose, aromatic acids and water.

2. An extract according to claim 1, in which the bitter principles and the other components are present in the hop extract in the same proportions as found in fresh hops.

3. A composition suitable for use in the hopping of beer, comprising an extract as claimed in claim 1 or 2.

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